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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,521	06/09/2006	Philippe Robert	128303	1059
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EXAMINER				
CHU, CHRIS C				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/582,521

**Applicant(s)**

ROBERT, PHILIPPE

**Examiner**

CHRIS C. CHU

**Art Unit**

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 April 2009.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16, 18, 21 - 36 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☒ Claim(s) 29 and 31 is/are allowed.  
6) ☒ Claim(s) 16, 18, 21 - 28, 30 and 32 - 36 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/003)  
Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Request for Continued Examination***

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 21, 2009 has been entered. An action on the RCE follows.

### ***Response to Amendment***

2. Applicant's amendment filed on April 21, 2009 has been received and entered in the case.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 16, 18, 21 – 23, 26 – 28, 33, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (U. S. Pat. No. 7,429,495) in view of Cheung (U. S. Pub. No. 6,446,326).

Regarding claim 16, Wan discloses in e.g., Fig. 5f – Fig. 5h microcomponent (the micro component; column 3, lines 32 – 34 and see e.g., Fig. 5g) comprising

- a hermetically-sealed microcavity (37; column 5, line 32 and column 6, lines 49 – 50) having a top side, a left side, and a right side (see e.g., Fig. 5g),
- the microcavity (37) delineated by a cover (33; column 6, lines 32 and 33) in which at least one hole (40; column 6, line 32 and see e.g., Fig. 5g and 5h) is formed, and,
- the microcomponent comprising, a plug (44; column 6, lines 41 and 42) covering the hole (40) and a part of the cover (33) over the periphery of the hole (40; see e.g., Fig. 5h),
- wherein the plug (44) is made of polymer (column 6, lines 52 – 62),
- the cover (33) encloses the top side, the left side, and the right side of the microcavity (37; see e.g., Fig. 5g), and
- the cover (33) is one solid layer (see e.g., Fig. 5g).

Wan does not disclose a sealing layer hermetically sealing the microcavity on the cover and the material of the sealing layer. Cheung teaches in e.g., Fig. 8 and Fig. 9 a sealing layer (46; page 5, paragraph 0066, line 2) hermetically sealing (page 5, paragraph 0067, lines 16 – 17) a microcavity (44; page 5, paragraph 0064, line 5 and see e.g., Fig. 8) on a cover (38; page 5, paragraph 0064, line 5) and the material (page 5, paragraph 0066, lines 5 – 7) of the sealing layer (46). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the material of the sealing layer and the sealing layer of Cheung as the specific material to form the sealing layer and into the package of Wan as taught by Cheung to increase hermetic seal (page 5, paragraph 0067, lines 16 – 17). Furthermore, the following

limitation is disclosed by the combined structure of Wan and Cheung that the sealing layer (46 of Cheung) and the plug (44 of Wan) being formed by distinct materials (page 5, paragraph 0066, lines 5 – 7 of Cheung and column 6, lines 52 – 62 of Wan).

Regarding claim 33, Wan and Cheung disclose the microcavity (37) enclosing an electromechanical microsystem (column 3, lines 32 – 34 and See e.g., Fig. 6i of Wan).

Regarding claim 35, Wan discloses in e.g., Fig. 5a – Fig. 5h microcomponent (the micro component; column 3, lines 32 – 34 and see e.g., Fig. 5g) comprising

- a sacrificial layer (36; column 6, line 37) on a substrate (10; column 5, line 34),
- a cover (33; column 6, lines 32 and 33), in which at least one hole (40; column 6, line 32) is formed, provided over the sacrificial layer (36) and over the substrate (10) at the periphery of the sacrificial layer (36; see e.g., Fig. 5e),
- a hermetically-sealed microcavity (37; column 5, line 32 and column 6, lines 49 – 50) formed by removal of all of the sacrificial layer (36) via the at least one hole (40; column 6, lines 31 – 40), and, on the cover (33; see e.g., Fig. 5f),
- the microcomponent (the micro component; column 3, lines 32 – 34 and see e.g., Fig. 5g) comprising, a plug (44; column 6, lines 41 and 42) covering the hole (40) and a part of the cover (33) over the periphery of the hole (40; see e.g., Fig. 5h),
- wherein the plug (44) is made of polymer (column 6, lines 52 – 62).

Wan does not disclose a sealing layer hermetically sealing the microcavity on the cover and the material of the sealing layer. Cheung teaches in e.g., Fig. 8 and Fig. 9 a sealing layer (46; page 5, paragraph 0066, line 2) hermetically sealing (page 5, paragraph 0067, lines 16 – 17) a microcavity (44; page 5, paragraph 0064, line 5 and see e.g., Fig. 8) on a cover (38; page 5,

paragraph 0064, line 5) and the material (page 5, paragraph 0066, lines 5 – 7) of the sealing layer (46). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the material of the sealing layer and the sealing layer of Cheung as the specific material to form the sealing layer and into the package of Wan as taught by Cheung to increase hermetic seal (page 5, paragraph 0067, lines 16 – 17). Furthermore, the following limitation “the sealing layer and the plug being formed by distinct materials” is disclosed by the combined structure of Wan and Cheung that the sealing layer (46 of Cheung) and the plug (44 of Wan) being formed by distinct materials (page 5, paragraph 0066, lines 5 – 7 of Cheung and column 6, lines 52 – 62 of Wan).

Regarding claim 18, Wan, as modified, discloses in Fig. 5a – Fig. 5h the polymer (44) being selected from photoresists (i.e.,  $\text{SiO}_2$ ; column 6, lines 52 – 62) and polyimide.

Regarding claim 21, Wan, as modified, discloses in Fig. 5a – Fig. 5h the dimension of the hole (40) being smaller than 5 micrometers (column 6, lines 34 and 35).

Regarding claim 22, Wan, as modified, discloses in Fig. 5a – Fig. 5h the hole (40) being arranged on the highest part of the microcavity (37; see e.g., Fig. 5f).

Regarding claim 23, Wan, as modified, discloses in Fig. 5a – Fig. 5h a plurality of holes (40; see e.g., Fig. 5f).

Regarding claim 26, Wan, as modified, discloses in Fig. 5a – Fig. 5h the plug (44) being non-hermetic (column 6, lines 49 – 52).

Regarding claim 27, Wan, as modified, discloses in Fig. 5a – Fig. 5h the material of the sealing layer (46 of Cheung) being selected from silicon dioxide, silicon nitride and metals (page 5, paragraph 0066, lines 5 – 7 of Cheung).

Regarding claim 28, Wan, as modified, discloses in Fig. 5a – Fig. 5h method for production of a hermetically-sealed microcavity of a microcomponent according to claim 16, successively comprising

- deposition of a sacrificial layer (the sacrificial layer 36; column 6, line 37) on a substrate (10; column 5, line 34 and see e.g., Fig. 5d),
- deposition of a first layer (33) forming the cover (see e.g., Fig. 5d), on the substrate (10) and sacrificial layer (the sacrificial layer 36; see e.g., Fig. 5d),
- etching, in the cover (33), of at least one hole (40) opening out onto the sacrificial layer (the sacrificial layer 36; column 6, lines 31 – 35 and see e.g., Fig. 5c),
- removal of the sacrificial layer (the sacrificial layer 36; column 6, lines 36 – 40), via the hole (40), so as to create the microcavity (37; see e.g., Fig. 5g),
- deposition of the sealing layer (46 of Cheung), so as to seal the microcavity hermetically (37), method comprising deposition of the plug (44) covering the hole (40) and a part of the cover (33) over the periphery of the hole (40; see e.g., Fig. 5h), after the sacrificial layer (the sacrificial layer 36) has been removed (Fig. 5f) and before the sealing layer (46 of Cheung) is deposited.

Regarding claim 36, Wan, as modified, discloses in Fig. 5a – Fig. 5h the geometry of the microcavity (37) being defined by the area of the removed sacrificial layer (36; see e.g., Fig. 5f).

5. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wan and Cheung as applied to claim 35 above, and further in view of Murari et al. (U. S. Pat. No. 6,779,247).

Regarding claims 24 and 25, while Wan and Cheung disclose the use of the plug, Wan and Cheung do not disclose the thickness (claim 24) and shape (claim 25) of the plug. Murari et al. teaches in e.g., Fig. 15 the thickness of a plug (40; column 5, lines 32 – 33) being comprised between 2 and 6 micrometers (column 5, lines 34 – 36) and the plug (40) comprising sloping sides (column 5, lines 34 – 37 and see e.g., Fig. 15). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to further apply the thickness and the shape of Murari et al. as the specific thickness and the shape to form the plug of Wan and Cheung as taught by Murari et al. to seal the top of the cavities and to prevent penetrate the cavities (column 5, lines 39 – 42).

6. Claim 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wan and Cheung as applied to claim 28 above, and further in view of Reichenbach et al. (U. S. Pub. No. 2004/0,065,932).

While Wan and Cheung disclose the use of the microcavity and the plug, Wan and Cheung do not disclose the material of the plug being a porous material (claim 30) and the method comprising a pumping step of the gas contained in the microcavity, through the porous material, before the sealing layer is deposited (claim 32). Reichenbach et al. teaches in e.g., Figs. 1 – 12 a plug (32; page 4, paragraph 0046, lines 1 – 3) being made of a porous material (page 4, paragraph 0048 and page 6, paragraph 0063, lines 1 – 8) and a method comprising a pumping step of the gas contained in the microcavity (26; page 3, paragraph 0043, lines 3 and 4), through the porous material (32), before the sealing layer (34; page 4, paragraph 0049, line 3) is deposited (page 4, paragraphs 0047 and 0049). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to further apply the porous material and

the method of Reichenbach et al. as the specific material and method to form the plug and the microcavity of Wan and Cheung as taught by Reichenbach et al. to be varied or modified (page 6, paragraph 0063, the last two lines).

7. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (U. S. Pat. No. 7,429,495) in view of Cheung (U. S. Pub. No. 6,446,326), and further in view of McNeil et al. (U. S. Pat. No. 6,352,874).

Regarding claim 34, Wan discloses in e.g., Fig. 5a – Fig. 5h microcomponent (the micro component; column 3, lines 32 – 34 and see e.g., Fig. 5g) comprising

- a hermetically-sealed microcavity (37), delineated by a cover (33) in which at least one hole (40) is formed (see e.g., Fig. 5f), and,
- the microcomponent (the micro component; column 3, lines 32 – 34 and see e.g., Fig. 5g) comprising a plug (44) covering the hole (40) and a part of the cover (33) over the periphery of the hole (40; see e.g., Fig. 5g).

Wan does not disclose a sealing layer hermetically sealing the microcavity on the cover and the material of the sealing layer. Cheung teaches in e.g., Fig. 8 and Fig. 9 a sealing layer (46; page 5, paragraph 0066, line 2) hermetically sealing (page 5, paragraph 0067, lines 16 – 17) a microcavity (44; page 5, paragraph 0064, line 5 and see e.g., Fig. 8) on a cover (38; page 5, paragraph 0064, line 5) and the material (page 5, paragraph 0066, lines 5 – 7) of the sealing layer (46). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the material of the sealing layer and the sealing layer of Cheung as the specific material to form the sealing layer and into the package of Wan as taught by Cheung to

increase hermetic seal (page 5, paragraph 0067, lines 16 – 17). Furthermore, the following limitation “the sealing layer and the plug being formed by distinct materials” is disclosed by the combined structure of Wan and Cheung that the sealing layer (46 of Cheung) and the plug (44 of Wan) being formed by distinct materials (page 5, paragraph 0066, lines 5 – 7 of Cheung and column 6, lines 52 – 62 of Wan).

Furthermore, Wan and Cheung does not disclose the material of the plug being phosphosilicate glass. McNeil et al. teaches in e.g., Fig. 2 a plug (150; column 4, lines 48 and 49) being made of phosphosilicate glass (column 4, lines 38 – 50). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to further apply the phosphosilicate glass of McNeil et al. as the specific material to form the plug of Wan and Cheung as taught by McNeil et al. to use a suitable sealing process, i.e., plasma-enhanced chemical vapor deposition (column 4, lines 38 – 45).

#### ***Allowable Subject Matter***

8. Claims 29 and 31 are allowed (see the previous Office action for the reasons of allowance).

#### ***Response to Arguments***

9. Applicant's arguments with respect to claim 16 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRIS C. CHU whose telephone number is (571)272-1724. The

examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Chris C. Chu  
Primary Examiner  
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/Chris C. Chu/  
Primary Examiner, Art Unit 2815  
Tuesday, May 5, 2009